

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 8783-2 (1995): Winding wires for submersible motors,
Part 2: Materials for dielectric and jacket [ETD 33:
Winding Wire]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



IS 8783 (Part 2) : 1995

भारतीय मानक

(Reaffirmed 2005)

निमज्जन मोटरों के वाइंडिंग तार — विशिष्ट

भाग 2 परावैद्युत और जैकेट की सामग्रियां

(पहला पुनरीक्षण)

Indian Standard

WINDING WIRES FOR SUBMERSIBLE MOTORS — SPECIFICATION

PART 2 MATERIALS FOR DIELECTRIC AND JACKET

(First Revision)

First Reprint NOVEMBER 1997

UDC 621.315.336.96 : 621.3.045 : 621.313.17 — 213.32

© BIS 1995

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 1995

Price Group 2

FOREWORD

This Indian Standard (Part 2) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Winding Wires Sectional Committee had been approved by the Electrotechnical Division Council.

This standard was originally published in 1978 covering PVC insulated winding wires for submersible motors for 85°C operation. Two other standards on winding wires for submersible motors, namely, IS 10051 : 1981 'Specification for PVC insulated winding wires for submersible motors for 105°C operation' and IS 12788 : 1989 'Specification for PVC insulated winding wires overcoated with nylon for submersible motors' have also been in vogue.

In the recent past there has been demand from the industry to make comprehensive revision of the existing standards on winding wires for submersible motors and also to include other types of insulation which are being extensively used in manufacture of winding wires for submersible motors. In view of this the new series of winding wire standards for submersible motors is being brought out as follows:

IS 8783	Winding wires for submersible motors — Specification:
Part 1 : 1995	Part 1 Conductor data
Part 2 : 1995	Part 2 Materials for dielectric and jacket
Part 3 : 1995	Part 3 Methods of tests
Part 4/Sec 1 : 1995	Part 4 Specification for individual wires, Section 1 HR PVC insulated winding wires
Part 4/Sec 2 : 1995	Part 4 Specification for individual wires, Section 2 Cross linked polyethylene insulated and polyamide jacketed wires
Part 4/Sec 3 : 1995	Part 4 Specification for individual wires, Section 3 Polyester and polypropylene insulated winding wires

With the publication of these standards the requirements of PVC insulated wires will be covered in (Part 4/Sec 1) of this series, and two new types of insulation, namely, XLPE insulated and polyester and polypropylene insulated wires have also been covered in this series.

While preparing this standard, assistance has been derived from the following:

ASTM D 4101-82	Specification for propylene plastic injection and extrusion materials published by American Society for Testing Materials (ASTM)
IEEE STD, 1019-1985	Recommended practice for specifying electric submersible pump cable polypropylene insulation Published by Institution of Electrical and Electronics Engineers (IEEE)

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

WINDING WIRES FOR SUBMERSIBLE MOTORS — SPECIFICATION

PART 2 MATERIALS FOR DIELECTRIC AND JACKET

(First Revision)

1 SCOPE

1.1 This standard (Part 2) specifies the requirements of dielectric and jacket materials for winding wires for submersible motors.

1.2 The types of materials covered by this standard are as given below:

- Type 1* HR PVC insulated wires for maximum rated conductor temperature of 85°C.
- Type 2* XLPE insulated and polyamide jacketed wires for maximum rated conductor temperature of 105°C.
- Type 3* Polyester and polypropylene insulated wires for maximum rated conductor temperature of 105°C.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	Title
1885 (Part 32) : 1993	Electrotechnical vocabulary : Part 32 Electric cables (<i>first revision</i>)
10810	Method of tests for cables:
Part 7 : 1984	Part 7 Tensile strength and elongation at break of thermoplastic and elastomeric insulation and sheath
Part 11 : 1984	Part 11 Thermal ageing in air
Part 12 : 1984	Part 12 Shrinkage test
Part 14 : 1984	Part 14 Heat shock test
Part 15 : 1984	Part 15 Hot deformation test

IS No.

Title

Part 30 : 1984	Part 30 Hot set test
Part 33 : 1984	Part 33 Water absorption test (Gravimetric)
Part 43 : 1984	Part 43 Insulation resistance test

3 TERMINOLOGY

For the purpose of this standard, in addition to the definitions given in IS 1885 (Part 32) : 1993 the following shall apply.

3.1 Dielectric (Insulation)

The prevention of the passage of electricity by using insulating materials.

3.2 Jacketing

It is the coating over the insulated wires, used to protect the insulation from environmental and mechanical abuses.

3.3 Variation

Difference between the mean value obtained after ageing and the mean value obtained without ageing, expressed as percentage of the latter.

3.4 Mean Value

Mean value for this standard shall be considered as average of 3 values eliminating maximum and minimum value taken from 5 readings.

4 REQUIREMENTS

4.1 The materials shall satisfy the requirements given in Table 1.

Table 1 Requirements for Dielectric and Jacket Materials

(Clause 4.1)

Sl No.	Tests	Unit	Type of Dielectric and Jacket							Method of Test (Ref to Part No. IS 10810)
			Type 1	Type 2		Type 3				
			HRPUC	XLPE	Poly- amide	Finished wire	Poly- ester	Polypro- pylene	Finished wire	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
i)	Volume resistivity, <i>Min</i>									
a)	At 27°C (<i>see</i> Note 1)	ohm-cm	1×10 ¹³	1×10 ¹⁴	N.A.	1×10 ¹⁴	1×10 ¹⁵	1×10 ¹⁵	1×10 ¹⁶	43
b)	At test temperature (<i>see</i> Note 2)	ohm-cm	1×10 ¹⁰	1×10 ¹²	N.A.	1×10 ¹²	1×10 ¹³	1×10 ¹³	1×10 ¹³	
ii)	Breakdown voltage, <i>Min</i>	kV/mm	Under consideration							
iii)	Before ageing									
a)	Tensile strength, <i>Min</i>	N/mm ²	12.5	12.5	40	N.A.	Under consideration	50		7
b)	Elongation at break, <i>Min</i>	Percent	125	200	125	N.A.	Under consideration	125		
iv)	Ageing in air oven									
a)	Treatment temperature (Tolerance ±2°C)	°C	135	135	135	N.A.	Under consideration	135		11
	Duration	Days	7	7	4	N.A.	Under consideration	7		
b)	Tensile strength									
1)	Value after ageing, <i>Min</i>	N/mm ²	12.5	12.5	40	N.A.	Under consideration	50		
2)	Variation, <i>Max</i>	Percent	±25	±25	±25	N.A.	Under consideration	±25		
c)	Elongation at break									
1)	Value after ageing, <i>Min</i>	Percent	125	200	125	N.A.	Under consideration	125		
2)	Variation, <i>Max</i>	Percent	±35	±25	±25	N.A.	Under consideration	±25		
v)	Shrinkage									
a)	Treatment temperature (Tolerance ±2°C)	°C	150	130	150	150	150	150	150	12
	Duration	Minutes	15	60	15	15	15	15	15	
b)	Shrinkage, <i>Max</i>	Percent	4	4	4	4	4	4	4	
vi)	Water absorption (gravimetric)									
a)	Treatment temperature (Tolerance ±2°C)	°C	70	70	N.A.	N.A.	—	—	70	33
	Duration	hours	24	24	N.A.	N.A.	—	—	24	
b)	Water absorbed, <i>Max</i>	mg/cm ²	2	1	N.A.	N.A.	—	—	2	
vii)	Hot set									
a)	Treatment temperature (Tolerance ±3°C)	°C	N.A.	200	N.A.	N.A.	N.A.	N.A.	N.A.	30
	Duration	Minutes	N.A.	15	N.A.	N.A.	N.A.	N.A.	N.A.	
	Mechanical stress	N/cm ²	N.A.	20	N.A.	N.A.	N.A.	N.A.	N.A.	
b)	Elongation under load, <i>Max</i>	Percent	N.A.	175	N.A.	N.A.	N.A.	N.A.	N.A.	
c)	Permanent elongation (set) after cooling, <i>Max</i>	Percent	N.A.	15	N.A.	N.A.	N.A.	N.A.	N.A.	
viii)	Hot deformation test									
a)	Test temperature (Tolerance ±2°C)	°C	95	N.A.	N.A.	115	N.A.	N.A.	115	15
b)	Time under load	hours	6	N.A.	N.A.	6	N.A.	N.A.	6	
c)	Depth of indentation, <i>Max</i>	Percent	50	N.A.	N.A.	25	N.A.	N.A.	25	

Table 1 — Concluded

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
ix)	Heat shock test									
a)	Treatment temperature °C (Tolerance $\pm 2^{\circ}\text{C}$)	150	N.A.	N.A.	N.A.	150	150	150	14	
	Duration	hours	1	N.A.	N.A.	N.A.	1	1	1	
b)	Visual examination	No signs of cracks or scales or sepa- ration of layers	—	—	—	No sign of cracks or scales or sepa- ration of layers	No sign of cracks or scales or sepa- ration of layers	No sign of cracks or scales or sepa- ration of layers		
x)	Melting point index	←—————Under consideration—————→								

NOTES

1 Volume resistivity test may be done at room temperature instead of 27°C . However, in case of doubt or dispute, the test results shall be confirmed by testing at 27°C .

2 a) For Type 1 Wires test temperature is 85°C .

b) For Type 2 and Type 3 Wires test temperature is 90°C

3 In case of test on insulation, if insulation of wire is of such nature that it cannot be separated from finished wire easily (without damaging the insulation and/or conductor) then it shall not be applicable and only test on finished wire shall be carried out.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc : No. ET 33 (3530)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 323 01 31, 323 33 75, 323 94 02

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :

Telephone

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

{ 323 76 17
323 38 41

Eastern : 1/14 C. I.T. Scheme VII M, V. I. P. Road, Maniktola
CALCUTTA 700054

{ 337 84 99, 337 85 61
337 86 26, 337 91 20

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022

{ 60 38 43
60 20 25

Southern : C. I. T. Campus, IV Cross Road, CHENNAI 600113

{ 235 02 16, 235 04 42
235 15 19, 235 23 15

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
MUMBAI 400093

{ 832 92 95, 832 78 58
832 78 91, 832 78 92

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE.
FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR.
LUCKNOW. NAGPUR. PATNA. PUNE. THIRUVANANTHAPURAM.

AMENDMENT NO. 1 MARCH 2000
TO
IS 8783 (PART 2) : 1995 WINDING WIRES FOR
SUBMERSIBLE MOTORS — SPECIFICATION
PART 2 MATERIALS FOR DIELECTRIC AND JACKET

(First Revision)

(Page 2, Table 1, col 4 under Type 1, classification) — Substitute 'HRPVC' for 'HRPUC'.

[Page 2, Table 1, Sl No. (i) Volume resistivity (a) and (b), col 8 and 9] — Substitute 'NA' for the values given for polyester and polypropylene.

[Page 2, Table 1, Sl No. (v) Shrinkage (a) and (b), col 8 and 9] — Substitute 'NA' for the values given for polyester and polypropylene.

[Page 3, Table 1, Sl No. (ix) Heat shock test (a) and (b), col 8 and 9] — Substitute 'NA' for the values given for polyester and polypropylene.

(ET 33)